

ROBUSTNEMA FOSTERI SP. NOV., GEN. NOV. (XYALIDAE, MONHYSTERIDA, NEMATODA), A COMMON NEMATODE OF MANGROVE MUDFLATS IN AUSTRALIA

by WARWICK L. NICHOLAS*

Summary

NICHOLAS, W. L. (1996) *Robustnema fosteri* sp. nov., gen. nov. (Xyalidae, Monhysterida, Nematoda), a common nematode of mangrove mudflats in Australia. *Trans. R. Soc. S. Aust.* 120(4), 161-165, 29 November, 1996.

A new genus with a single species, *Robustnema fosteri*, collected from mangrove mudflats is described. The circular amphids, six outer labial and six cephalic setae in one ring, annulated cuticle, single testis and single ovary with posterior vulva, place the genus in the Xyalidae. The buccal cavity is small, conical and unarmoured, the lips low and simple. The cardia and ovary are distinctive. Reproductive females are wide-bodied with a very large uterus filled with developing eggs and unhatched juveniles.

KEY WORDS: Taxonomy, *Robustnema*, Xyalidae, Monhysterida, Nematoda, Mangrove.

Introduction

A new species of nematode that is common in mangrove mudflats in south east Queensland and New South Wales is described. The possession of outer labial and cephalic sensillae in a single ring, circular amphids, an outstretched single gonad in both sexes, a posterior vulva, and an annulated cuticle place the new species in the Xyalidae (Monhysterida). It was previously misidentified as *Filippjeva* sp. (Hodda and Nicholas 1986; Nicholas *et al.* 1991) because of a resemblance to *F. crucis* Blome and Schrage 1985. However, more recent close inspection has shown that the reproductive organs are quite different and this nematode has been placed in a new genus.

Materials and Methods

Type specimens were collected at low tide from estuarine mud close to mangroves at Pine River Estuary, which opens into Moreton Bay north of Brisbane. Additional specimens have been collected from mangroves in New South Wales. Nematodes were fixed in the mud with 5% formalin immediately after collection and were recovered from the mud by a combination of sieving and centrifugation in aqueous colloidal silica (Ludox, Du Pont de Nemours) with specific gravity adjusted to 1.2. The mud was thoroughly dispersed in tap water, centrifuged at 6000 g for 7 minutes, the supernatant discarded, the residue re-suspended in colloidal silica, centrifuged again at 6000 g for 7 minutes, the supernatant passed through a nylon sieve with 60 µm

mesh, and nematodes retained by the filter back-washed into a petri dish. Specimens of the new species were picked up with an eyebrow hair (mounted on a stick) under a dissecting microscope and transferred to 5% aqueous glycerol. After the water had been allowed to evaporate at 40° C the nematodes were transferred to fresh anhydrous glycerol and mounted on slides with cover slips supported by glass beads (ballatum) and ringed with glyceel (Gurr).

Measurements, given in µm, were made from drawings of 12 specimens using a camera lucida. Type specimens are in The South Australian Museum (SAMA) and their numbers in the Australian Helminth Collection (AHC) are given.

***Robustnema* gen. nov.**

Six inner labial papillae, six outer labial setae and six cephalic setae in one ring; circular amphids. Six simple low lips, unarmoured buccal cavity, cuticle annulated. Cardia convex cap to anterior pair of intestinal cells. Single gonad in each sex, vulva close to anus, uterus becomes capacious sac holding developing eggs and juveniles.

***Robustnema fosteri* sp. nov.**
(FIGS 1-9)

Holotype: ♂, Pine River Estuary Queensland, 30.viii. 1986, SAMA AHC27695.

Measurements: Table 1.

Description of Holotype male

Typical nematode form (Fig. 3), curved ventrally in anal region, cuticle uniformly annulated. Tail proximally conical, posteriad 20% narrow, almost cylindrical (Fig. 6). Body setae restricted to five

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TABLE 1. *Measurements of Robusnema fosteri* sp. nov.

| Sex Type | Holotype | | Males | | | Females | |
|-----------------------|----------|------|-----------------|--------------|------|-----------------|--------------|
| | | Mean | Paratypes SD | n=5 Range | Mean | Paratypes SD | n=6 Range |
| Length | 1252 | 1242 | 29.28 | 1196-1273 | 1379 | 178 | 1089-1554 |
| Max. width | 71 | 68 | 2.80 | 65-71 | 114 | 29 | 71-161 |
| Cephalic setae length | 5.1 | 5.3 | 0.38 | 4.7-5.8 | 6.4 | 1.06 | 5.5-8.2 |
| Amphid diam. | 5.9 | 7.0 | 1.05 | 5.8-8.6 | 5.2 | 0.55 | 4.3-5.9 |
| Buccal cavity width | 10 | 11.4 | 0.55 | 11-12 | 12.5 | 1.97 | 10-14 |
| Buccal cavity depth | 14 | 18.8 | 2.39 | 16-20 | 17.8 | 2.33 | 14-20 |
| Head to nerve ring | 106 | 89 | 21.5 | 54-111 | 100 | 17.8 | 82-129 |
| Pharynx length | 212 | 224 | 19.4 | 200-254 | 238 | 27.0 | 192-268 |
| Head to vulva | | | | | 1098 | 170 | 805-1226 |
| Head to anus | 1040 | 1047 | 20.0 | 1018-1078 | 1164 | 152 | 905-1309 |
| Tail length | 226 | 197 | 18.1 | 185-226 | 206 | 17.3 | 184-226 |
| Width at anus | 57 | 56 | 5.27 | 49-62 | 68 | 8.13 | 59-77 |
| Spicule, arc length | 62 | 56 | 4.73 | 54-62 | | | |
| De Man's a | 17.6 | 18 | 0.680 | 17.6-19.6 | 12.5 | 2.09 | 9.0-15.3 |
| " b | 5.9 | 5.6 | 0.374 | 5.0-6.0 | 5.8 | 0.60 | 4.9-6.7 |
| " c | 5.5 | 6.3 | 0.463 | 6.1-6.7 | 6.7 | 0.60 | 5.9-7.5 |
| " e* | 4.0 | 3.5 | 0.420 | 3.0-4.1 | 3.1 | 0.42 | 2.6-3.8 |
| " V % | | | | | 79 | 3.00 | 74-85 |

paired, ventral setae, evenly spaced between anus and tail tip, 4 µm long, plus three terminal 4 µm long setae. Six stout lips arched over buccal cavity forming shallow dome arising from very short parallel-sided region, demarcated from cervical region by strong annular groove (Fig. 1). Six minute inner labial papillae on lips; six short outer labial and six equally short slightly wider cephalic setae inserted side by side at base of lips; amphids circular, situated at level of buccal cavity. Buccal cavity small, simple, conical, without teeth, cuticular ridges or denticles. Pharynx cylindrical without muscular bulb, cardia with about 12 small cells forming convex cap to anterior pair of intestinal cells (Fig. 4). No renette cell, 'excretory' duct or pore. Intestinal cells large, paired, with prominent nuclei and granular cytoplasm, rectum very short, about 30 µm long. Testis single, outstretched, to left of intestine, extending anteriorly almost to cardia, long seminal vesicle filled with rounded spermatozoa, extending posteriorly a little beyond mid-body, long vas deferens, very short ejaculatory duct (Fig. 3). Short strong spicules, arc length 62 µm (Fig. 7), with capitulum, shallow angular bend half-way along, extreme tip forms narrow peg; gubernaculum two slightly curved rods; two very small papilliform pre-anal supplements, 46 and 77 µm anterior to anus (Fig. 6). Three post-anal caudal glands.

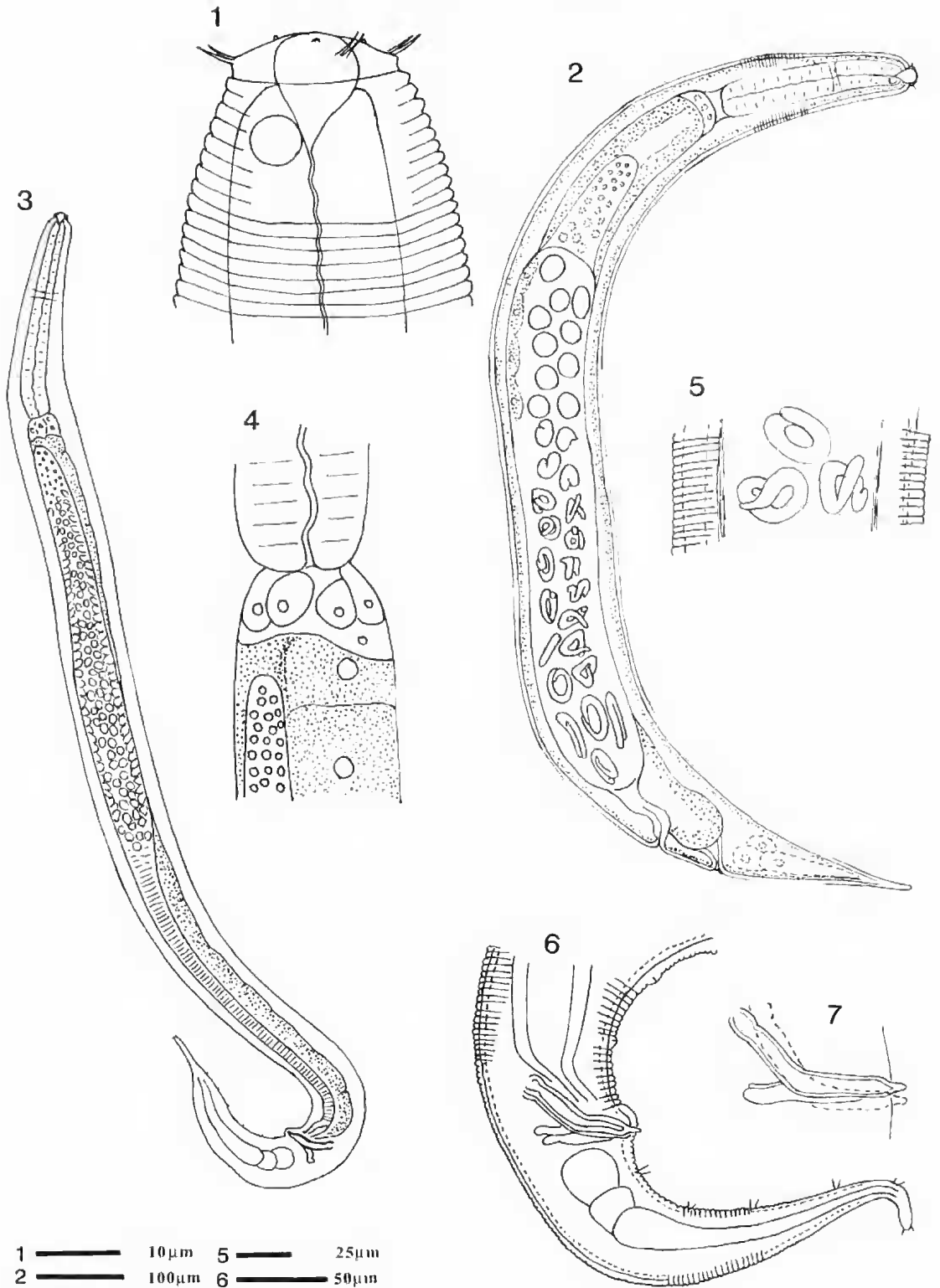
Paratypes: From Pine River Estuary Queensland, 30.viii. 1986, SAMA AHC27660-27663.

Measurements: Table 1.

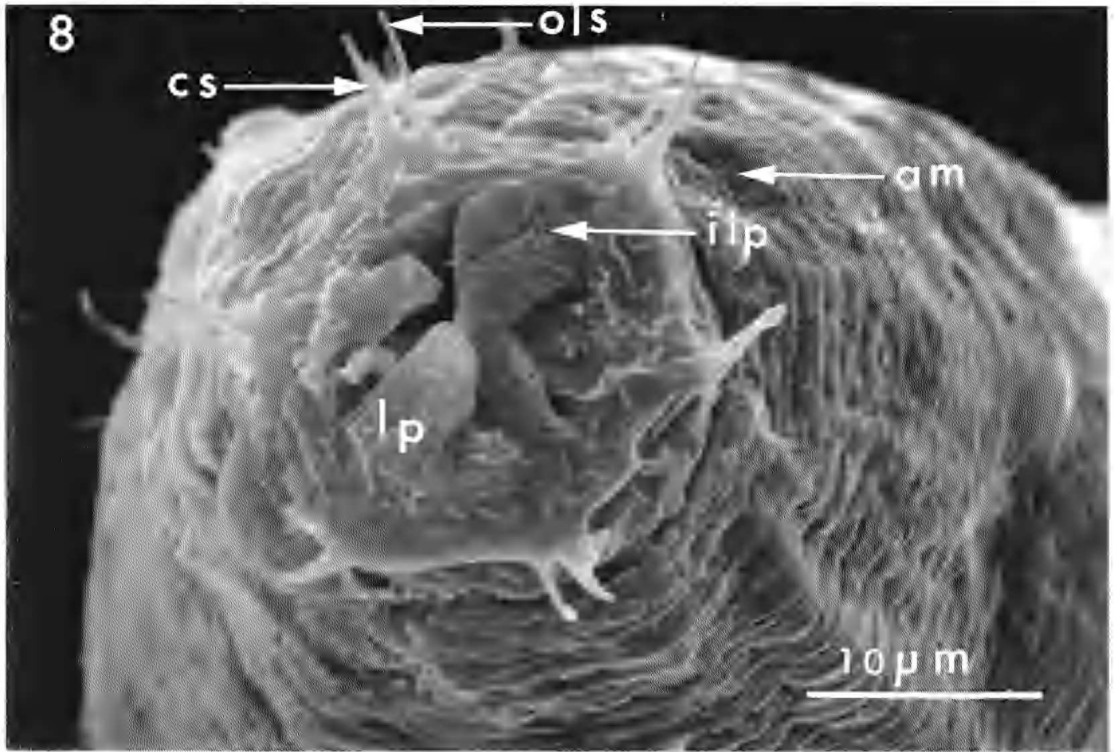
Five ♂♂ essentially similar to holotype. The tip of the tail is not necessarily bent dorsally as it is in the holotype. Pre-anal supplements very difficult to find in some males when they do not protrude in profile. Five ♀♀ of much stouter build than males, but not all arched dorsally as in paratype illustrated in Fig. 2. Uterus forms a large thin-walled sac occupying more than half the body length. The uterus is filled with developing eggs anteriorly and fully-formed unhatched juveniles posteriorly (Fig. 5). There may be as many as 28 juveniles and embryonated eggs. The egg shell is not rigid and it accommodates the shapes of the developing embryos, which are about 30-40 µm long. Juveniles, curled within the thin flexible shell are 150-200 µm long. Three to six granular cells, probably unfertilised oocytes, lie along the anterior dorsal wall of the uterus.

Scanning electron microscopy (Figs 8, 9) confirms that there are six cephalic setae, inserted beside the corresponding outer labial setae. The cephalic setae are wider at their bases than the outer labial setae. Figures 8 and 9 show that the six lips are deeply incised and that the head is hexagonal when viewed *en face*.

Figs. 1-7. *Robusnema fosteri* sp. nov. 1. Male head. 2. Gravid female. 3. Entire male. 4. Cardia. 5. Small portion of annulated cuticle and uterus containing unhatched juveniles. 6. Male tail, spicules, caudal glands, setae and pre-anal supplements. 7. Spicules and gubernaculum. 1, 4, 6 and 7 holotype male; 2, 3, and 5 paratype male and female AHC27661



| | | | |
|---|-------------|---|------------|
| 1 | 10 μ m | 5 | 25 μ m |
| 2 | 100 μ m | 6 | 50 μ m |
| 3 | 100 μ m | 7 | 25 μ m |
| 4 | 10 μ m | | |



Figs. 8-9. Scanning electron micrographs of head of *Robustinema fosteri* sp. nov. ols outer labial seta, cs cephalic seta, am amphid, ilp inner labial papilla, lp lip.

Differential diagnosis

The presence of six cephalic setae in the second ring of sensilla, while not unique, is unusual in Xyalidae as is the small size of the unarmoured buccal cavity and low profile of the lips. The shape of the cardia and ovarian development are quite distinctive within the Xyalidae. Together these characters justify generic status.

Habitat

Mangrove mudflats.

Distribution

Pine River estuary, opening into Moreton Bay Queensland; Fullerton Cove opening to the Hunter River estuary New South Wales and the Clyde River estuary New South Wales.

Etymology

Generic name from the strongly built body, especially the very stout-bodied reproductive female; specific name after a colleague.

Discussion

The female reproductive system is unusual and its development warrants further study. Only a discontinuous developmental series has been observed. In immature females, the outstretched ovary is filled with small cells, presumably oogonia. After fertilisation, large eggs in early cleavage stages appear amongst the small cells. By this time the ovary extends forwards almost to the level of the cardia. Later the ovary is largely transformed into a capacious uterus filled with developing eggs and, towards the posterior, unhatched juveniles. Some large granular cells, with single nuclei, lie along the dorsal wall of the uterus. These large cells are probably unfertilised oocytes and ovarian development can be described as hologonic rather than showing the much more usual telogonic development. No spermatozoa were recognised within the female gonad.

Acknowledgments

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